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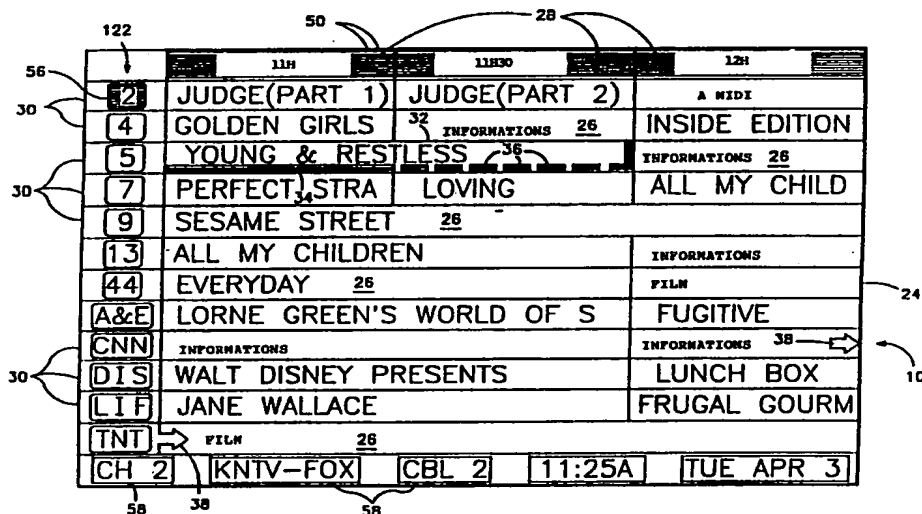
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(54) Title: **USER INTERFACE FOR TELEVISION SCHEDULE SYSTEM**



(57) Abstract

Screen (10) for a user interface of a television schedule system and process consists of an array (24) of irregular cells (26), which vary in length, corresponding to different television program lengths of one half hour to one-and-one half hours or more. Because of the widely varying length of the cells (26), if a conventional cursor used to select a cell location were to simply step from one cell to another, the result would be abrupt changes in the screen (10). By restricting cursor movements to the regular cells, abrupt screen changes will be avoided. A conventional offset shadow (34) which is a black bar underlines the entire cell and wraps around the right edge of the cell. To tag the underlying position which defines where the cursor (32) is and thus, where it will move next portions (36) of the black bar outside the current underlying position are segmented, while the current position is painted solid.

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-1-

USER INTERFACE FOR TELEVISION SCHEDULE SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates generally to a system
5 and process that allows a television viewer to access
on screen television program listings and use the program
listings in an easy and convenient way to control
operation of a video cassette recorder (VCR) or other
recording device. In addition, it relates to such a
10 system and process that creates a directory of recorded
programs by title for easy retrieval and program
playback. More particularly, it relates to such a system
and process in which the VCR or other recording device
is controlled by a simple selection of program title and
15 a record command, even for recording at a future date
and time. Most especially, it relates to such a system
and process incorporating an intuitive user interface.

2. Description of the Prior Art:

The difficulty of setting a VCR for automatic
20 recording at a future date is notorious. Even users who
are technically sophisticated will often make mistakes
in the VCR programming procedure that cause them to
record the wrong program or not to record anything at
all. This difficulty has even resulted in a substantial

body of humor dedicated to the subject of programming VCRs.

The difficulty of VCR programming has been alleviated somewhat by the development of VCRs that use a television set as a display for user prompts and feedback to the user during the programming process. U.S. Patent 4,908,713, issued March 13, 1990 to Michael R. Levine, discloses such a VCR using the television set as a display for VCR programming with an interactive user interface for directing the user on a step-by-step basis. Such a user interface removes a great deal of the mystery from VCR programming, but users still have difficulty with such a command-based interface and encounter problems carrying out the programming without making mistakes that cause them to miss recording programs they would like to watch at a different time than when they are broadcast.

Commonly assigned U.S. Patent 4,706,121, issued November 10, 1987 to Patrick Young, discloses a system and process in which user selections from television schedule information are used for automatic control of a VCR. That patent also contains a description of a proposed user interface for such a system and process. However, the provision of a highly intuitive user interface that makes such a system and process easy and convenient to operate is a difficult task. Further development of this system and process has produced considerable change in the user interface as originally proposed.

In addition to simplifying VCR programming, users who do a substantial amount of program taping also need an improved system and process for keeping track of their recorded programs. Commonly assigned Application Serial No. 07/219,971, filed July 15, 1988, in the name of Patrick Young, discloses a system and process that

provides indexing capability for taped material. A user interface for a television schedule system and process should also handle this capability on an intuitive basis.

Thus, while the art pertaining to the control of
5 VCRs and to television schedule systems is a well-developed one, a need still remains for a television schedule system and process incorporating an improved user interface. In particular, unlike most computer menus, a grid TV guide is an array of irregular cells,
10 where the cell size can vary from a fraction of an hour to many hours--extending well beyond the current screen. If this array is navigated by a cursor that goes from cell to cell, a single cursor command can produce violent screen changes. For example, a cursor right command may
15 cause an abrupt jump to a cell situated several hours from the current page. Not only is this unsettling, but may take considerable effort to recover. Clearly, a gentler cursor motion is needed for the irregular cells found in a grid TV guide.

20 Printed grid television schedule guides often include additional information besides the program title and broadcast names. Such grids are also typically provided in combination with a more detailed printed schedule that contains a synopsis of each program,
25 whether the program is a repeat, ratings for movies, and other information. When using a television set as a display for a schedule system, the size and resolution of the television display limit the amount of text that can be displayed with the grid. Improved techniques are
30 required for conveying the most amount of information to the user in an easily understood manner within the limitations of the television display. When a large number of channels are available for viewing, there is also a need to order the display of information most
35 conveniently for the user.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a television schedule system and process with a user interface that is configured to compensate for the particular nature of the television schedule information.

It is a further object of the invention to provide such a user interface having a cursor operation that compensates for an irregular grid format of the television schedule information.

It is another object of the invention to provide such a user interface in which the schedule information is presented in a format that compensates for limited resolution of the television display.

It is still another object of the invention to provide such a user interface in which supplemental schedule information is presented in overlays that obscure a minimum amount of useful other information.

It is a still further object of the invention to provide such a user interface in which order of presentation of the schedule information is customizable by user preference.

The attainment of these and related objects may be achieved through use of the novel television schedule system and process user interface herein disclosed. A television schedule system including a user interface in accordance with this invention has a display, A means is connected to the display for displaying the television schedule on the display as an array of irregular cells which vary dimensionally in length, corresponding to different television program time lengths. A means is connected to the display for providing a cursor with the television schedule on the display. The cursor has a variable length corresponding to the length of a selected one of the irregular cells

-5-

in which the cursor is located. A means is connected to the means for providing the cursor for moving the cursor in the array in a series of equal length steps. At least some of the irregular cells have a length which is greater than the length of the steps.

In the process of operating a television schedule system with the user interface of this invention, the television schedule is displayed as an array of irregular cells which vary dimensionally in length, corresponding to different television program time lengths. A cursor is provided with the television schedule on the display, the cursor has a variable length corresponding to the length of a selected one of the irregular cells in which the cursor is located. The cursor is moved in the array in a series of equal length steps, with at least some of the irregular cells having a length which is greater than the length of the steps.

In another aspect of the invention, a control system for a video recording machine has a controller for starting and stopping the video recording machine, for recording video information on recording media, and for playing recorded video information on recording media. A display generator provides display image generation signals. A means supplies information to the display generator for generation of display images relating to operation of the video recording machine. The means for supplying information includes means for generating a recording media position indicator graduated as segments corresponding to programs recorded on the recording media.

In a process for controlling a video recording machine, a recording media position indicator is graduated as segments corresponding to programs recorded on the recording media. The recording media position

indicator is displayed as position of a selected one of the recording media in the video recording machine is changed.

In a further aspect of the invention, a television
5 schedule system a display and means connected to the display for displaying the television schedule on the display. The means for displaying a schedule is configured to allow selection by a user of a first number of desired channels for display of schedule information
10 which is less than a second number of available channels. A programmable tuner is connected to the means for displaying a schedule. The programmable tuner is configured to follow the first number of desired channels when the television schedule is shown on the display in
15 response to a channel up or channel down command. The programmable tuner is configured to follow the second number of available channels in the absence of the television schedule on the display in response to a channel up or channel down command.

20 In a process for operating a television schedule system, a first number of desired channels is selected for display of schedule information, which is less than a second number of available channels. The schedule information is displayed on a display. The first number
25 of desired channels is followed when the schedule information is shown on the display in response to a channel up or channel down command. The second number of available channels is followed in the absence of the television schedule on the display in response to a
30 channel up or channel down command.

The attainment of the foregoing and related objects, advantages and features of the invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the
35 invention, taken together with the drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1-3 are diagrammatic representations of a television schedule grid incorporating the user interface for the system and process of this invention.

5 Figure 4 is a diagrammatic representation of a screen display used in the system and process of the invention.

10 Figures 5-7 are additional diagrammatic representations of the television schedule grid incorporating the user interface for the system and process of the invention.

Figure 8 is a flow chart for understanding the operation of the Figure 7 diagram.

15 Figures 9-10 are additional diagrammatic representations of screen displays of the user interface for the system and process of the invention.

Figure 11 is a flow chart for understanding the operation of the Figures 9-10 diagrams.

20 Figures 12-13 are diagrammatic representations of taping and tape index screen displays of the user interface for the system and process of the invention.

Figure 14-17 are diagrammatic representations of program selection by category screen displays of the user interface for the system and process of the invention.

25 Figure 18 is a flow chart for understanding operation of the Figures 14-18 diagrams.

Figure 19 is a flow chart for understanding operation of the Figure 20 diagram.

30 Figure 20 is a diagrammatic representation of a channel customization screen display of the user interface for the system and process of the invention.

Figure 21 is a diagrammatic plan view of a control panel for the system of the invention.

35 Figure 22 is a block diagram of a television schedule system in accordance with the invention.

DETAILED DESCRIPTION OF THE INVENTION

Turning now to the drawings, more particularly to Figures 1-7, there are shown a series of menu screens 10, 12, 14, 16, 18, 20 and 22 used in operation of the system and carrying out the process of the invention. Screens 10, 12, 14, 18 and 20 each consists of an array 24 of irregular cells 26, which vary in length, corresponding to different television program lengths of one half hour to one-and-one half hours or more. The array is arranged as three columns 28 of one-half hour in duration, and twelve rows 30 of program listings. Some of the program listings overlap two or more of the columns 28 because of their length. Because of the widely varying length of the cells 26, if a conventional cursor used to select a cell location were to simply step from one cell to another, the result would be abrupt changes in the screens 10, 12, 14, 18 and 20 as the cursor moved from a cell 26 of several hours length to an adjacent cell in the same row. Such abrupt changes disorient a user of the system.

An effective way of taming the motion is to assume that behind every array 24 is an underlying array of regular cells. By restricting cursor movements to the regular cells, abrupt screen changes will be avoided. However, there is now a potential ambiguity between the underlying cell which governs cursor movement and a visible cell 26 which holds the program title.

Viz.: if the cursor moves in half hour steps, and the cell length is, say four hours, should the cursor be 1/2 hour long or four hours long? If the cursor only spans the interval of the underlying cell (1/2 hour), the cursor appears to be highlighting a segment of the cell, which is misleading. On the other hand, if the cursor spans the entire four hours of the TV listing, the cursor underlying position will be obscure. In this

case, cursor right/left commands will appear inoperative while traversing a long cell. The absence of feedback following a cursor command is befuddling to users. Therefore, an innovative cursor 32 (Figure 1) for the
5 irregular array 24 is required which satisfies several conflicting requirements.

With the cursor 32, the entire cell 26 is 3-D highlighted, using a conventional offset shadow 34. The offset shadow 34 is a black bar that underlines the
10 entire cell and wraps around the right edge of the cell. To tag the underlying position--which defines where the cursor 32 is and thus, where it will move next--portions 36 of the black bar outside the current underlying position are segmented, while the current position is
15 painted solid.

For an half hour cell 26, the offset shadow's underline bar will always be solid black. Figures 2 and 3 show the cursor 32 as it appears for a half-hour program. For programs that go beyond 1/2 hour, only the
20 current 1/2 hour position will be solid black. All remaining positions will be stripped. If the cursor is moved left or right, the solid section will move accordingly, providing complete visual feedback. Thus, this modified 3D offset shadow cursor 32 satisfies the
25 demands stated above: it spans the entire cell, yet clearly highlights the current underlying position. Movement of the cursor 32 will always be visible even for cells 26 that are much longer than the underlying cell.

30 A grid continuity icon 38 is shown in Figure 1. Printed grid television schedule guides often include parenthetical comments, (such as "cont'd") to indicate program continuity. In an electronic guide displayed on a TV screen, limited text space precludes
35 parenthetical comments. To conserve space, an icon 38

will be used to indicate cell 26 continuity. At the border of a cell 26 that is continued to the next screen, an arrow icon 38 pointing to the right will be overlaid. The arrow direction always points to right, which is the direction of program elapse.

Figures 2 and 3 show recording status representations. When a program has been selected for recording, its listing cell 26 will be outlined or highlighted in red, as indicated at 40. If guard time has been added or deleted, the cell will be stretched or shrunk to reflect the change. Cell 26 continuity will be treated the same as above. There are four other record status representations:

If the cell is actively being recorded, the outline will blink off and on.

A recorded cell will be displayed with a solid red background 42 (Note: Not shown in drawing).

A mis-recorded cell will be indicated by red hash-marks 44 over the title. A mis-recording can be the result of insufficient tape, VCR loss of power, stopped before completion, etc.

A program linking icon 46 is shown in Figure 5. After each schedule update, the schedule system examines the new listings for the occurrence of any titles that match a title in Linked Titles (Figure 23). If a title matches, it will automatically be tagged for recording. When a linked program is displayed in the guide, it will have two identifiers: a red outline 40 indicating that the title has been selected for recording, and a link icon 46 appended to the title to indicate that this title was link-selected. After a linked program has been recorded, it will be treated like any recorded program with the title shaded in red. To differentiate this recording from others, the link icon will remain appended to the title.

-11-

Further details on the linking feature are given in screen 19 of Figure 23. 1) A linked program 47 may be suspended by the user (perhaps to avoid conflict with a pending recording), by de-selecting the link title in the Link List screen, under the Record Memo command. A suspended link program will still be identified by a link icon, but the red-outline will be suppressed since the program will not be recorded. 2) A smart link process is used to tame the matching of titles when there is a likelihood of excessive candidates for recording. The Lucy show, for example, is often syndicated on several channels. Untamed linking of Lucy may result in a plethora of recordings. For such series, the link list will include the channel and time as well as the link title. For the avid Lucy-phile, the user can locate each series individually for linking. If there is more than one link title of the same name, the series will be numbered, in the order of acquisition. Thus, the second Lucy will be identified as Lucy (Two), at 47.

Figures 1-3 show the columns 28 headed by half-hour header status indicators. The 1/2 hour header strip across the top of the grid TV guide has two auxiliary functions: 1) as an indicator 48 of pending or in-progress recording scheduled at that time, and 2) as a time-bar 50 to delineate the past from the future. The past is darkened, while the future is lightly shaded. If there is an in-progress recording, the 1/2 hour header will be red-outlined at 48 in the same manner as a pending recording title cell 26.

Figure 6 shows a television schedule grid screen 20 with a program note overlay 52. With limited text capacity on TV displays, it is preferable to display as many lines of TV listings as feasible. To handle program notes, which are text intensive, on-demand overlays 52

-12-

are used. Program note overlays 52 may include any or all of the following information:

- o A program genre
- o Program description
- 5 o Stars and personalities
- o Year of release
- o Episodic subtitles
- o Run-time of program
- o Elapse time of the program
- 10 o Critique (Star Ratings)
- o Rating (PG, G, etc.)
- o Call letter, channel markers
- o Closed caption, stereo.

Program notes for a selected program are overlaid
15 over the grid guide upon request. The program note can be toggled off/on using a SELECT command. The program note 52 overlays and hides 3 or 4 listings of a guide. To minimize concealment of the guide, an auto-roving note is used. The program note will overlay either the top
20 half or bottom half of the screen, as necessary to avoid masking the title of the selected listing. If the cursor 32 is in the upper half of the screen, the note will appear in the bottom half, and vice versa. If the cursor 32 is moved to the lower half of the screen, the note
25 will automatically position itself in the upper half of the screen.

Figures 1-3 and 5-6 show a channel column 54 in the television schedule grid 24. Favorite stations and cable channels may be listed together to create a personalized
30 grid guide. The channel column 54, unlike most printed TV guides, has a mix of over-the-air station names and cable services names.

The grid 24 guide lists channels by favorite combinations of station number and cable names, and not
35 in the usual numerical order. When viewing the grid 24 guide, a Tuner Up/Down channel command will be mapped according to the channels and order listed on the screen. When not viewing the guide, the tuner sequence will

revert back to the usual numerical order. When the last channel on a page is reached, the next Tuner command will change the channel to the channel listed at the beginning of the following page.

- 5 When a channel to which the tuner is tuned is displayed on the grid 24, it is highlighted, as shown
-

ERROR: ioerror
OFFENDING COMMAND: image

STACK:

-filestream-
-filestream-
-mark-
-savelevel-
-savelevel-